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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,622	12/30/2003	Steven H. Barss	09991-147001	8274

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EXAMINER	
LEBRON, JANNELLE M	
ART UNIT	**PAPER NUMBER**
2861	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/749,622	BARSS ET AL.	
	Examiner	Art Unit	
	Jannelle M. Lebron	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-18,33-35 and 37* is/are allowed.

6)☒ Claim(s) *19-32 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/01/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the fluid reservoir arranged below the nozzle opening must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: Blank spaces in Page 7 of the Specification must be filled.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 36 is rejected under 35 U.S.C. 102(b) as being anticipated by Agarwal (US Patent 6,254,219).

5. Agarwal discloses a "drop ejector, comprising:

a flow path [301] in which fluid is pressurized to eject drops from a nozzle opening [209], the nozzle opening [209] being disposed in a well [figure 1], the well having a relatively long axis and a short axis [column 6, lines 38-52; Figures 6A-6B]."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claim 19, 20, and 28-32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazama (US Patent 6,511,156) in view of Agarwal (US Patent 6,254,219).

9. Kazama discloses a "drop ejector, comprising:

a flow path [301] in which fluid is pressurized to eject drops from a nozzle opening [209], the nozzle opening [209] being disposed in a well [figure 1]."

Thus, Kazama teaches the claimed limitations except "the ratio of the well width to the nozzle opening width being about 1.4 to about 2.8."

10. Agarwal teaches a inkjet printhead "having an opening at the inside surface of the orifice at the inside surface [115] of the orifice plate of diameter d_2 which is

approximately three to five times the diameter of d_1 of the opening which will be the orifice aperture at the outside surface [213] of the orifice plate [column 2, lines 45-51]." The reference teaches a ratio of the well diameter to the nozzle diameter of approximately 3, which can be taken to be about 2.8 as suggested in the claim. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a ratio of the well width to the nozzle width about 1.4 to 2.8. One would have been motivated to modify Kazama to provide a desirable meniscus depth and improve printing quality as taught by Agarwal.

11. Regarding claim 20, Kazama discloses an inkjet printhead "wherein the well depth is about 0.15 to 0.5 of the nozzle opening width [column 15, lines 9-15; column 26, lines 11-21; the well depth is 1-10μm, thus 15 to 28% of the nozzle opening diameter (35μm)]."

12. Regarding claim 28-31, Kazama discloses an inkjet printhead "wherein the nozzle opening is centered in the well [Figure 44]", "the nozzle opening and well have a common geometry [Figure 44]", "the nozzle opening and well are circular [Figure 44], and "the nozzle opening and the well are defined by a common body [Figure 49]."

13. Regarding claim 32, Kazama discloses an inkjet printhead "wherein the body is a silicon material [column 3, lines 38-41]."

14. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazama (US Patent 6,511,156) in view of Agarwal (US Patent 6,254,219) and in further view of Bentin (US Patent 4,413,268).

15. Kazama in view of Agarwal teaches the claimed limitations as set forth above in claim 19 except "wherein the spacing between the well perimeter and nozzle perimeter is about 0.2 or more of the nozzle width."

16. Bentin discloses a drop ejector wherein the spacing between the trough diameter and the nozzle diameter is about 20% [Column 4, lines 1-19; i.e. d=50μm, D-d ≤ 20μm, therefore, (D-d)/2=10μm thus the 20% spacing]. It would have been obvious to one of ordinary skill in the art at the time of the invention to space the well perimeter and nozzle perimeter about 20% of the nozzle width apart. One would have been motivated to modify Kazama in view of Agarwal to prevent the ink from dripping and affect jetting as taught by Bentin.

17. Claims 22-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazama (US Patent 6,511,156) in view of Agarwal (US Patent 6,254,219) and in further view of Mackay (US Patent 6,139,136).

18. Kazama in view of Agarwal teach the claimed limitations as set forth above in claims 19 and 21 except "including a pressure control that controls pressure through the nozzle opening to fluid in the well", "a fluid reservoir arranged below the nozzle opening", "a fluid level monitor", "a flow controller that maintains fluid level", "a vacuum source that comprises a mechanical vacuum, the mechanical vacuum arranged to reduce pressure in an ink reservoir", and "a controller to maintain the fluid pressure at the meniscus in the range of about -0.5 to -10 inwg."

19. Regarding claim 22, Mackay discloses "the use of hydrostatic pressure control at the nozzles of ink jet print heads has been utilized to effectively maintain an ink

meniscus in each nozzle [column 1, lines 6-8]". It would have been obvious to one of ordinary skill in the art at the time of the invention to include a pressure control that controls pressure through the nozzle opening to fluid in the well. One would have been motivated to modify Kazama in view of Agarwal to keep a column of ink between the ink channels within the printhead and the printhead nozzles after the printhead has been energized to eject ink droplets as taught by Mackay.

20. Regarding claim 23, Mackay discloses "it is known to position the ink reservoir below the vertical level of the printhead nozzles [column 1, lines 33-35]." It would have been obvious to one of ordinary skill in the art at the time of the invention to include a fluid reservoir arranged below the nozzle opening. One would have been motivated to modify Kazama in view of Agarwal to maintain the desired negative pressure at the printhead nozzles as taught by Mackay.

21. Regarding claims 24 and 25, Mackay discloses a thermistor [63] that, when the ink drops below it, sends a signal to the microprocessor [61], which begins pumping ink into ink well [27] [column 4, lines 2-13]. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a fluid level monitor and a flow controller that maintains fluid level. One would have been motivated to modify Kazama in view of Agarwal to ensure that the negative pressure in the ink reservoir is never greater than a predetermined range as taught by Mackay.

22. Regarding claim 27, Mackay discloses that "the desired negative pressure range at each printhead should be maintained between approximately –10 to –40 millimeters of water pressure [-0.39 to –1.57 inches of water pressure; column 3, lines 45-48]." It

would have been obvious to one of ordinary skill in the art at the time of the invention to include a controller to maintain the fluid pressure at the meniscus in the range of about -0.5 to -10 inwg. One would have been motivated to modify Kazama in view of Agarwal to maintain the ink meniscus at each nozzle as taught by Mackay.

23. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazama (US Patent 6,511,156) in view of Agarwal (US Patent 6,254,219) and in further view of Wouters (US Patent 6,957,882).

24. Kazama in view of Agarwal teach the claimed limitations as set forth above in claims 19 and 21 except "includes a vacuum source that comprises a mechanical vacuum, the mechanical vacuum arranged to reduce pressure in an ink reservoir."

25. Wouters discloses a vacuum inlet [9] on top of the ink chamber [7] that extracts air from the top of the ink chamber [column 4, lines 14-25]. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a vacuum source that reduces pressure in an ink reservoir. One would have been motivated to modify Kazama in view of Agarwal to keep a stable negative pressure in the chamber and compensate the positive hydrostatic pressure due to gravity as taught by Wouters.

Allowable Subject Matter

26. Claims 1-18, 33-35 and 37 are allowed.

27. The following is a statement of reasons for the indication of allowable subject matter:

Prior art does not disclose or suggest the claimed "meniscus defining a fluid depth above the edge of he nozzle opening equal to about 1 to 15% of the nozzle opening width"

28. Claims 2-18, 33-35, and 37 are allowed since they depend on allowable claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jannelle M. Lebron whose telephone number is (571) 272-2729. The examiner can normally be reached on Monday thru Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David M. Gray can be reached on (571) 272-2119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DAVID M. GRAY
PRIMARY EXAMINER

JML